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# TV White Spaces: Bridging Malaysia's Digital Divide with Digital Infrastructure

With the pandemic forcing educational, social, and commercial interactions into online spaces, connectivity has become fundamental, and the Internet has become a lifeline – but not for everyone. While Malaysians turned to the Internet to work from home, keep businesses afloat, continue lessons, and stay connected, many remained without Internet access and devices.



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Almost 40% of students do not have access to devices for online lessons,<sup>1</sup> and rural computer usage remains at 54% compared with 74% in urban areas.<sup>2</sup> As the digital divide threatens to become a digital chasm, Malaysia continues to depend on fiberisation, which tends to be cost-intensive and time-consuming compared with other technologies that have the potential to complement fiberisation efforts.

One such example is using white spaces, the unused frequencies in the broadcast spectrum, to connect wirelessly to the Internet.

## Adopting technology to bridge the gap

Wireless technologies, such as TV white spaces (TVWS) — unutilised broadcasting frequencies — are critical to closing the digital divide. In the past, these white space buffers were placed between active television channels to prevent interference between adjacent channels. Thanks to advancements in technology, these spaces are no longer needed as analogue television broadcasts in many countries have been replaced by more spectrally efficient digital television transmissions.

These Ultra High Frequency (UHF) frequencies originally intended for television have good propagation and building penetration characteristics, and this is the reason they were first chosen for TV broadcasting. It has since been researched and proven that this unutilised spectrum buffer can be repurposed to beam broadband to communities.

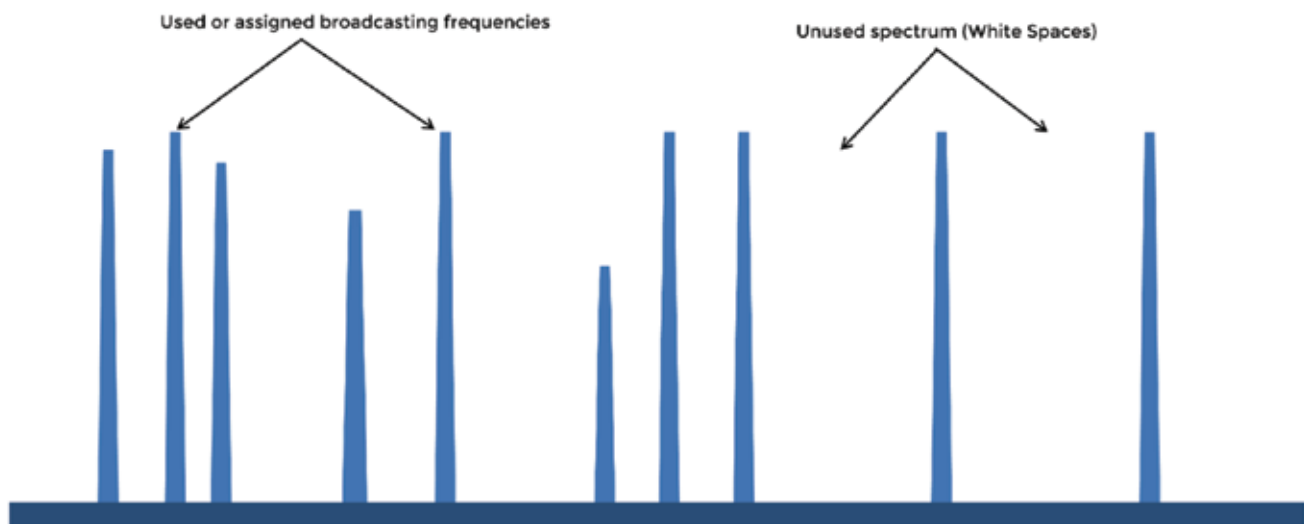


Figure 1: Assigned spectrum at different frequencies, with white spaces in between

## Going wireless

According to Pew Research, wired technologies such as phone landlines, cable or broadband take longer to adopt. In contrast, wireless technologies, such as radio and colour broadcast television, achieved near-universal adoption within 25 years.<sup>3</sup>

The CISCO VNI Global IP Traffic Forecast 2017 – 2022 shows that there is a consistent trend which highlights the increase in overall internet traffic, and a decrease in fixed line traffic. By 2022, 77% of total internet traffic is expected to be wireless (Wi-Fi and mobile).

Waiting on the deployment and adoption of wired technologies, like fibre-optic connections, to close the digital divide is not an option when so many people across the nation lack access.

Among TVWS' advantages are a longer range and greater coverage area compared with conventional connectivity. It also has greater obstacle penetration in challenging terrain, which makes it suitable for rural locations. This technology has been implemented in Kenya, the Philippines, and neighbouring Singapore.

Malaysia stands to greatly benefit by leveraging this technology to bridge the digital divide. The implementation of TV white spaces is complementary to fiberisation, providing remote and rural areas with an option for connectivity without having to bear the high cost of laying fibre through dense forests or mountainous areas.

## Why should we consider this technology?

As governments, educators, students, and businesses scrambled to move online almost overnight, internet usage across mobile traffic and Wi-Fi have increased since the pandemic struck our shores in March 2020.

With many of us relying on the internet for various activities including education, entertainment, staying in touch with loved ones, and e-commerce, Malaysia's internet traffic rose by 23.5% in the first week of the 2020 Movement Control Order, with the second week showing a further increase of 8.6%.<sup>4</sup> This caused speeds to fall, affecting user experience and resulting in longer load times.



While local telecommunications and internet service providers have been working hard to increase bandwidth capacity to ensure continued delivery of essential services, complementary technologies such as TV White Spaces could help lighten the load on existing digital infrastructure, and take Malaysia forward in the direction of a multi-technology multi-frequency-band approach towards affordable Internet connectivity, with an emphasis on license-exempt spectrum access and technologies such as Wi-Fi in 2.4 GHz, 5 GHz, and the newest Wi-Fi 6E in the 6 GHz band, as well as TV White Space in the sub-1 GHz Ultra High Frequency/Very High Frequency (UHF/VHF) TV band.

The Malaysian Communications and Multimedia Commission's recent public consultation on opening the entire 1200 MHz of the 6 GHz band (5925-7125 MHz) for license-exempt usage, is certainly a step in the right direction. This could dramatically boost Wi-Fi capacity

for end user, consumer, enterprise, and emerging technology use in both urban and rural areas. As the pandemic does not distinguish between urban, suburban, peri-urban, or rural areas, unconnected or under-connected populations risk becoming more vulnerable and isolated if they lack the digital means to access essential services, especially education, contact tracing applications such as MySejahtera, financial services, and healthcare.

License-exempt access to vacant UHF band TV channels (TV White Spaces or TVWS) can enable rapid deployment of low cost, long-range connectivity in underserved peri-urban, rural, and remote areas. TVWS can provide direct connectivity to end user devices or provide a backhaul link for Wi-Fi hotspots, supporting rural clinics, telemedicine, and remote learning.

**License-exempt access to TVWS for Broadband Services has been permitted in several countries, including the United States, United Kingdom, Canada, South Africa, Kenya, Philippines, Singapore, and South Korea.**



# Proposed 3-step plan to accelerate the adoption and deployment of TVWS:

## PLAN

Regulator and/or Internet Service Provider (ISP) determines locations for new or additional connectivity. When needed, conduct complete spectrum scan to identify vacant Ultra High Frequency (UHF) TV channels in each location. Real-time spectrum sensing can also be allowed as an alternative. If not yet available, build a spectrum inventory on TVWS channel availability.

## AUTHORISE

Regulator issues temporary, renewable license-exempt authorisations to utilise designated channels in specified locations.

## DEPLOY

Deployment of networks and reporting of coverage and usage data back to regulator which can be used to fine-tune the spectrum inventory, and serve as input to a formal regulatory framework.

## Recommendations:

- Designate connectivity providers as essential services
- Streamline type-approval processes for TVWS radio equipment
- Expedite equipment imports with preferential treatment on custom duties and clearance
- Make public funds available to support smaller connectivity providers
- Make public funds available to support pilots and larger-scale rollout of TVWS
- Make data available on spectrum inventory and broadband coverage
- Maximize infrastructure sharing among connectivity providers, allow antenna siting on public buildings, towers, and utility poles. Facilitate grid or solar power.



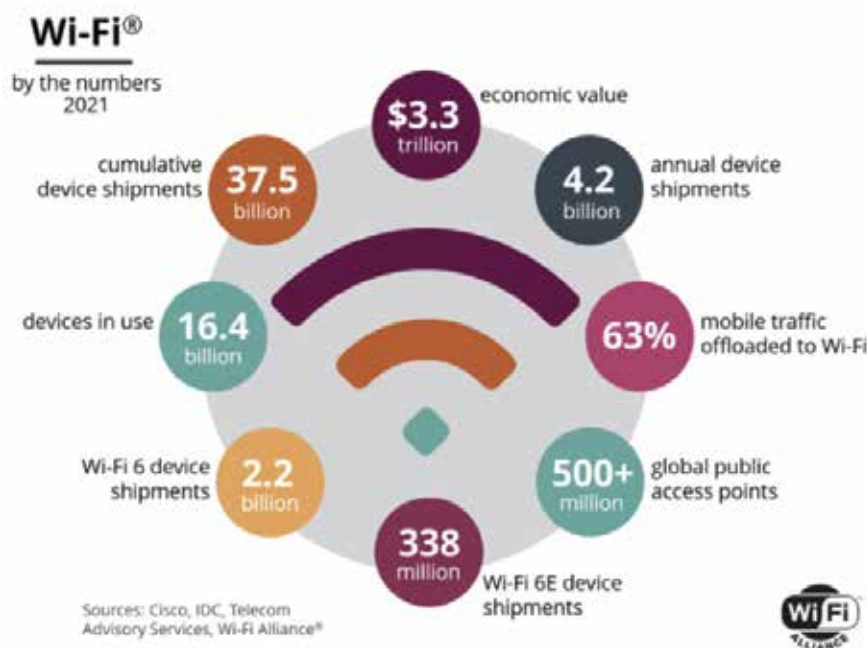


Figure 3: Value of Wi-Fi

As illustrated in the above diagram produced by the Wi-Fi Alliance, there is great economic value which can be unlocked by enabling connectivity, especially as it is increasingly treated as the electricity of the 21st century – powering up classrooms, businesses, and nations, and enabling socio-economic continuity. The global economic value of Wi-Fi in 2021 is estimated at \$3.3 trillion USD. By 2025, that value is expected to grow to \$4.9 trillion USD.<sup>5</sup>

The Malaysia Digital Economy Blueprint stipulates that Malaysia will have 100% internet access by 2025. While we must recognise the various ongoing efforts to increase internet access, these must be accelerated, along with the deployment of complementary technologies such as TV White Spaces. With education, economic activity, and social interactions forced into online spaces, stable and accessible internet connectivity is no longer a luxury – it is critical infrastructure.

<sup>1</sup> Almost 40pct of students can't study at home as they lack electronic devices (nst.com.my)

<sup>2</sup> <https://www.epu.gov.my/sites/default/files/2021-02/malaysia-digital-economy-blueprint.pdf> (page 31)

<sup>3</sup> How TV white space is helping bridge the digital divide – On the Issues (microsoft.com)

<sup>4</sup> Malaysian Communications And Multimedia Commission (MCMC) | Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM) - Media Statement: Changing Usage Patterns Influence Internet Speed In Malaysia

<sup>5</sup> Value of Wi-Fi | Wi-Fi Alliance